**SUPPLEMENTAL TEXT**

**Contamination Calculations***:*

Below we describe the calculation from section 6 and Table 3. Here we simulate a DO14C concentration that may result from a sample with contaminated DI14C if C-fixation rates measured in the subglacial environment persisted in frozen storage:

|  |  |  |
| --- | --- | --- |
| **Constant** | **Measured value** | **Unit** |
| C-fixation rate | 2.7 | nmol C/day/liter |
| Within-protocol DO14C concentration | 0.0531 | Fm |
| Measured DOC concentration, within protocol sample | 51000  | nmol C/liter |
| Measured DI14C in outside-protocol sample | 4.2673 | Fm |

*Table S1: Variables used in calculations below*

First, we calculate the amount of DIC converted to DOC in a 1L water sample if observed subglacial C-fixation rates (Christner et al., 2014) persist in storage:

$$2.7 nmol C d^{-1}l^{-1}×240 d=648 nmol C∙l^{-1}$$

Next, we determine the proportion of total DOC that is likely to have been assimilated from DIC, *pi,*

based on our assumption of rate.

$$p\_{i}= \frac{648 nmol C l^{-1}}{5100 nmol C l^{-1}}=0.0127$$

Using a binary mixing model, we calculate what the DO14C would be if assimilation of contaminated DIC allowed for carry over of contamination into the DOC of our outside-protocol sample.

$$Fm\_{calc}= p\_{i}Fm\_{i}+\left(1-p\_{i}\right)Fm\_{o}=\left(0.0127\right)4.2673Fm+\left(0.9873\right)0.0531Fm=0.1066 Fm $$

…where the subscripts i and o are for inorganic (DOC derived from DIC in the bottle) and organic (the originally present DOC), respectively. If we assume that the contaminated assimilated C is being mixed into a sample of radiocarbon free water, the resulting DO14C could be calculated as follows:

$Fm\_{calc}=p\_{i}Fm\_{i}+\left(1-p\_{Ai}\right)Fm\_{o}=\left(0.0127\right)4.2673=+\left(0.9873\right)0=0.0542 $Fm

Using rates of dark [14C] bicarbonate incorporation from SLW, the calculated outside-protocol DOC in this sample, which could have resulted from the slow assimilation of obviously contaminated DIC (Fm = 4.2673), is alarmingly similar to the measured value of DO14C in the same sample (Table S1, equation 4).  At those rates of assimilation, which are likely higher than what actually occurred in the frozen sample bottle, 1.3% of the DOC we measured could have come from contaminated DIC. The sample we took from within our protocol was taken during a cast of the Niskin bottle prior to any contact with the chemical laboratory, and DOC was measured at Fm = 0.0531 (Table S1). Both samples were frozen solid for storage and shipment in amber bottles, and the only possibility of microbial assimilation of DIC into DOC would have been in any small veins in which liquid water and concentrated salts were present (Santibanez et al., 2017, 2019). Furthermore, the sample was from SLM, which likely had lower cell counts and metabolic rates than SLW. Thus, our calculation represents a high end of potential contribution from the contaminated DIC; if the rates of autotrophic assimilation were similarly an order of magnitude lower in SLM, than other factors may have contributed to the elevated amounts of radiocarbon in the outside-protocol DOC sample.

In either case, two outcomes are important. First, the conundrum of whether to trust our outside protocol DOC values illustrates the insidious nature of 14C contamination in settings such as these. In this case, we took ample precautions to break from protocol and sample from the Niskin bottle after it had been in the chemistry laboratory. Our outside-protocol results suggest that freezing of samples may allow some limited exchange between the DIC and DOC pools. In this case, the amber bottle is not limiting to adapted to assimilate inorganic carbon without (i.e. in an environment underneath 1 km of ice). However, salt concentrations were extremely low in this environment compared to open ocean samples. Given these competing factors, it is noted that we likely were able to see evidence of DIC-DOC exchange in a frozen sample because of the amplified signal produced by the contamination of the DIC in the outside protocol sample. This exercise shows that:

1. We have a DOC sample, sampled within our protocol, that likely avoids all sources of contamination and that

2. Our radiocarbon contamination prevention protocol was likely necessary despite the fact that our other success hides the reasons for such precaution.

**Swipe Testing Data**

We include all results from our swipe testing in tabular form (Table S2). Because the site locations within the sediment laboratory point to specific locations, we include a schematic of this 40 foot shipping container used for natural-level 14C work (Fig S1).

Figure S1: Schematic map of sediment laboratory used in SALSA Project field work. Specific site locations are labeled and correspond to locations of swipe testing for which results are listed in Table S2.

**Table S2 Description**

Table S2 includes results from all swipe testing performed in preparation for and during the SALSA field season (See Fig 2 of main text for timeline of swipe testing). Herein we include the timeframe over which swipe testing was performed, swipe tests were analyzed, and results of the swipe tests. We include the submitted sample names as well as site descriptors that correspond with our camp map (Fig 3A) and our sediment lab schematic (Fig S1).